# Tuna Newsletter

National Marine Fisheries Service
• Southwest Region
• Southwest Fisheries Center



LIBRARY

MAY 23 1988

National Marine Fisheries Service
2570 Dole Street
Honolulu, Hawaii

## IN THIS ISSUE


Issue 89 May 1988



- **The U.S. tuna industry in 1987:** Cannery receipts up slightly; ex-vessel prices and wholesale prices up.....1
- **New U.S. rules regulate importing yellowfin tuna taken in association with dolphins:** Rules designed to protect dolphins.....6
- **Computer model tracks dolphin and tuna vessel movements:** Model intended to test utility of using tuna vessel data to estimate dolphin abundance.....7
- **Economic performance of the U.S. purse seine fleet 1979-1985:** Increasing productivity offset by falling ex-vessel prices.....9
- **U.S.-Mexico trade agreeement signed:** SWR solicits trade and investment issues to be discussed under this agreement.....9
- **Recent developments in tuna fisheries:** News from the South Pacific, western Pacific, Costa Rica, Ecuador, Mexico & Peru.....10



*Wes Parks, Editor*


## THE U.S. TUNA INDUSTRY IN 1987


*Wes Parks*, SWFC
*Pat Donley*, SWR
*Sam Herrick*, SWFC



**HIGHLIGHTS**: During 1987, 72 vessels in the U.S. tropical tuna purse-seine fleet made at least one trip, down one from 1986 and down 14% from the average number active for the period 1983-1986. Approximately 54% of U.S. purse-seiners active in 1987 operated in the eastern Pacific and 46% in the western Pacific. These distributions are essentially the same for both 1986 and for the longer term 1983-1986 average. Total receipts by U.S. canneries in 1987 were 532,704 short tons (st), up 2% from total deliveries in 1986 and up 4% from average 1983-86 deliveries. Domestic deliveries were up 12% from 1986; imports were down 6%. Yellowfin was the largest component of total cannery receipts in 1987 followed by skipjack. Yellowfin was the largest component of domestically caught cannery receipts; albacore the largest component of imports. Imports contributed 52% to total U.S. cannery receipts. The western Pacific Ocean was the major fishing area for tuna delivered to U.S. canneries in 1987. The eastern Atlantic was the major source of albacore, the western Pacific the major source of skipjack and the eastern Pacific the major source of yellowfin. As in 1986, the major non-U.S. suppliers during 1987 were South Korea and the Seychelles. Contract prices for domestically-caught raw tuna delivered to U.S. canneries in Puerto Rico increased dramatically from the first to the third quarter of 1987. Wholesale list prices in California for canned tuna also increased. U.S. canners packed 33.5 million cases of tuna in 1987, the largest pack since 1978.


**During the fourth quarter of 1987, 66 purse-seiners** in the U.S. tropical tuna fleet made at least one trip (Table 1). This is a decrease of one compared to the number of vessels active in the fourth quarter of 1986. Total capacity was down by 5%. As in 1986, vessels active in 4th quarter 1987 concentrated their

**Table 1.** Number of active U.S. purse-seine vessels and capacity (st) in the fourth quarters of 1987 and 1986.

| AREA | 1987 | 1986 |
|---|---|---|
| | No. vessels | |
| WAT | 0 | 1 |
| EP | 37 | 33 |
| WP | 29 | 34 |
| Total | 66 | 67 |
| | Capacity | |
| WAT | 0 | 1,200 |
| EP | 36,387 | 33,325 |
| WP | 35,875 | 42,375 |
| Total | 72,262 | 75,700 |

operations in the eastern and western Pacific fishing areas. There was no effort by U.S. vessels in the Atlantic or Indian Oceans in the fourth quarter.

**For all of 1987, 72 U.S. purse-seiners** made at least one trip, down one from 1986 (Table 2). The number of vessels active in 1987 was down 14% from the average number active for the period 1983-1986, continuing the decline from the maximum of 110 vessels active in 1983. Total capacity of U.S. purse-seiners active in 1987 was down 4% from capacity in 1986 and down 21% from the 1983-1986 average.

An average of 62 U.S. purse-seiners per month were active in 1987, slightly more than the average number active during months of 1986 (59) and less than the average number for the period 1983-1986 (72) (Fig.1). Monthly activity showed only a slightly discernible trend over months in 1987, having slightly more activity in February, March and April than in other months. Monthly capacity at sea showed roughly the same trend.

Approximately 54% of U.S. purse-seiners active in 1987 operated in the eastern Pacific and 46% in the western Pacific (Fig. 2). This distribution is essentially the same as distributions for both 1986 and for the longer term (1983-1986) average.

**During the fourth quarter of 1987, U.S. cannery receipts of all tuna species totaled 125,897 st**, essentially the same as in the fourth quarter of 1986 (Table 3).

Yellowfin tuna was the major component of fourth-quarter U.S. cannery receipts in 1987, contributing 43% of the total, followed by skipjack at 34% (Table 3). This is the reverse of the situation in 1986 when skipjack contributed 47% to receipts and yellowfin 36%.

**Total receipts by U.S. canneries in 1987 were 532,704 st**, up 2% from total deliveries in 1986 and up 4% from average 1983-86 deliveries (Table 4). Domestic deliveries were up 12% from 1986; imports were down 6%.

**Table 2.** Number of active U.S. purse-seine vessels and capacity (st) in years 1983 to 1987.

| PERIOD | WAT[1] | ETP | WTP | TOTAL |
|---|---|---|---|---|
| | | No. Vessels | | |
| 1983 | 1 | 74 | 62 | 110 |
| 1984 | 4 | 48 | 61 | 97 |
| 1985 | 5 | 52 | 40 | 89 |
| 1986 | 3 | 42 | 36 | 73 |
| Avg. 83-86 | 3.2 | 54 | 50 | 92.2 |
| 1987 | 0 | 40 | 34 | 72 |
| | | Capacity | | |
| 1983 | 1,700 | 68,330 | 75,845 | 113,655 |
| 1984 | 4,780 | 44,161 | 74,260 | 103,801 |
| 1985 | 5,580 | 49,011 | 48,445 | 94,366 |
| 1986 | 3,180 | 42,295 | 44,675 | 80,750 |
| Avg. 83-86 | 3,810 | 50,949 | 60,806 | 98,143 |
| 1987 | 0 | 37,852 | 42,025 | 77,677 |

[1]WAT = western Atlantic, ETP = eastern tropical Pacific, WTP = western tropical Pacific.

**Table 3.** U.S. cannery receipts of domestic and imported raw tuna (st) by species for fourth quarters of 1987 and 1986.

| YEAR | SOURCE | ALB | BF | SJ | YF[1] | TOTAL |
|---|---|---|---|---|---|---|
| 1987 | Domestic | 1,387 | 28 | 18,688 | 38,333 | 58,436 |
| | Imported | 27,905 | 0 | 23,688 | 15,868 | 67,461 |
| | Total | 29,292 | 28 | 42,376 | 54,201 | 125,897 |
| 1986 | Domestic | 1,019 | 240 | 27,151 | 26,251 | 54,661 |
| | Imported | 20,941 | 0 | 31,304 | 18,459 | 70,704 |
| | Total | 21,960 | 240 | 58,455 | 44,710 | 125,365 |

[1] Includes a small amount of bigeye and blackfin tuna.

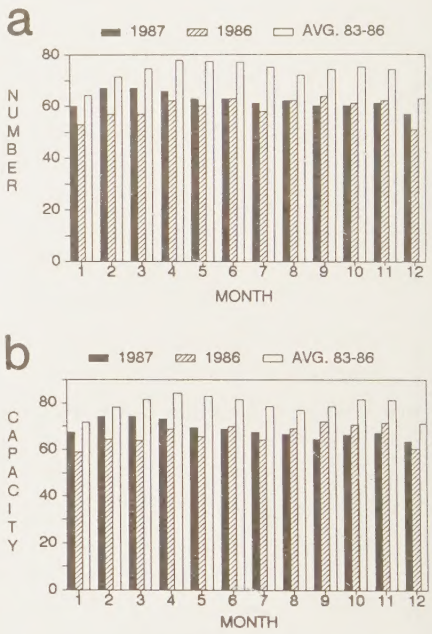



**Fig. 1.** Number of active U.S. purse-seine vessels by month in 1987, 1986 and the average for the period 1983 - 1986 (a). Capacity of active U.S. vessels by month (b).

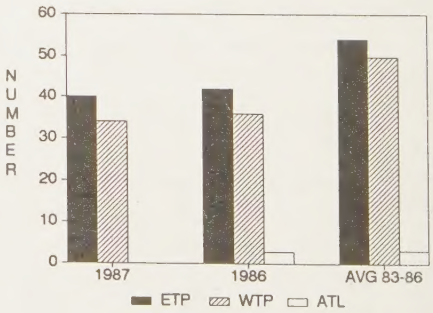



**Fig. 2.** Number of active U.S. purse-seine vessels by ocean area in 1987, in 1986 and the average for 1983 to 1986.

**Table 4.** U.S. cannery receipts of domestic and imported raw tuna (st) by species for 1987, 1986 and the average for the period 1983-1986.

| YEAR | SOURCE | ALB | BF | SJ | YF[1] | TOTAL |
|---|---|---|---|---|---|---|
| 1987 | Domestic | 2,836 | 328 | 87,315 | 163,457 | 253,936 |
| | Imported | 101,361 | 0 | 95,058 | 82,349 | 278,768 |
| | Total | 104,197 | 328 | 182,373 | 245,806 | 532,704 |
| 1986 | Domestic | 35,279 | 3,948 | 90,605 | 129,114 | 227,194 |
| | Imported | 112,292 | 0 | 105,032 | 79,135 | 296,459 |
| | Total | 115,819 | 3,948 | 195,637 | 208,249 | 523,653 |
| Avg. 83-86 | Domestic | 8,684 | 1,974 | 118,822 | 115,824 | 245,306 |
| | Imported | 93,286 | 16 | 116,962 | 56,624 | 266,887 |
| | Total | 101,970 | 1,990 | 235,784 | 172,448 | 512,192 |

[1] includes a small amount of bigeye and blackfin tuna.

Monthly receipts of raw frozen tuna to U.S. canneries averaged 44,000 st during 1987 with an atypical peak of about 71,000 st in September, a peak not seen in 1986 or in the 1983-86 average (Fig. 3). Monthly 1987 deliveries showed a slight increase from around 35,000 st in January to around 45,000 st in midyear, then returned to lower levels at year-end. This general trend is comparable to both the 1986 trend and to the longer term (1983-1986) average trend.

**Total cannery receipts in 1987 were dominated by yellowfin tuna,** which provided 46% of the total (Fig. 4a). Skipjack was the second greatest contributor at 34%. The dominance of yellowfin in 1987 repeated the situation in 1986, whereas over the longer term (1983-86), average skipjack receipts exceeded average yellowfin receipts. Receipts of domestically-caught tuna were even more weighted toward yellowfin which contributed 64% of the total in 1987 (Fig. 4b). Yellowfin was also the largest segment of domestic deliveries in 1986 (57%), but over the longer term (1983-86), domestic yellowfin and skipjack deliveries were essentially identical.

Albacore comprised 36% of total receipts of imported raw tuna to U.S. canneries in 1987 while skipjack and yellowfin made-up 34% and 30% (Fig. 4c). The 1987 pattern essentially repeated that of 1986; however,over the longer term (1983-86), skipjack, at 44%, comprised the greater part of average annual receipts of imported tuna followed by albacore, 35%, and yellowfin, 21%.

**In 1987, imports contributed 52% to total U.S. cannery receipts** while domestic deliveries accounted for 48% (Fig. 5). Imports were slightly more important in 1986, but, over the longer term (1983-86), averaged essentially the same contribution as in 1987.

**The western Pacific Ocean was the major fishing area for tuna delivered to U.S. canneries in 1987,** contributing 39% of total receipts (Fig. 6a). The 1987 pattern closely repeats both the 1986 pattern where the western Pacific con-

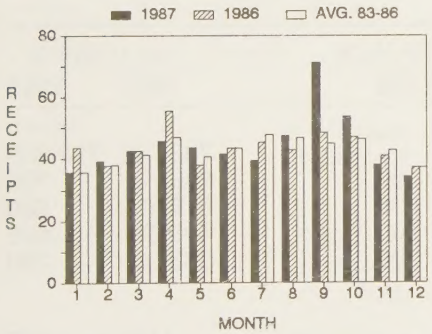



**Fig. 3.** Receipts of raw frozen tuna by U.S. canneries (1000 st) by month in 1987, 1986 and the average for the period 1983-1986.

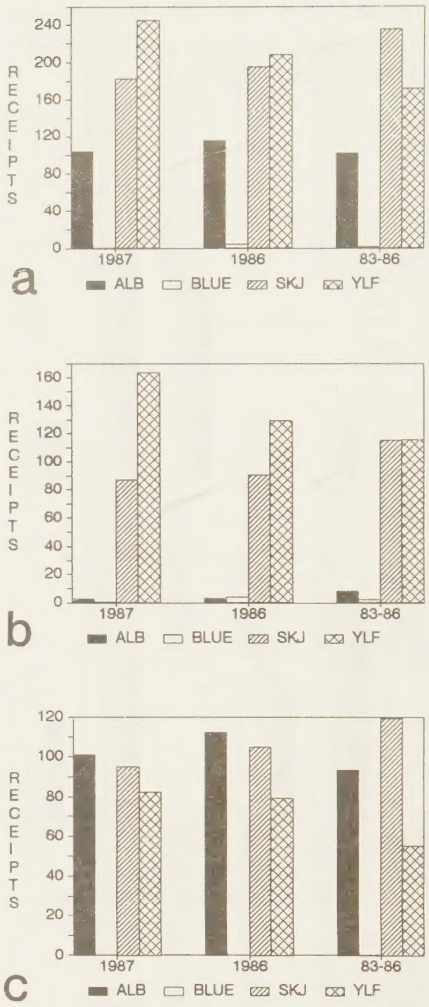



**Fig. 4.** Receipts of raw tuna by U.S. canneries (1000 st) by major species group in 1987,1986 and the average for 1983-86. (a) total receipts (b) receipts from domestic vessels, and (c) receipts of imported tuna.

**Fig. 5.** Receipts of raw tuna by U.S. canneries (1000 st) by source in 1987, 1986 and the average for 1983-1986.

tributed 35% and the longer-term (1983-1986) average pattern where it contributed 44%.

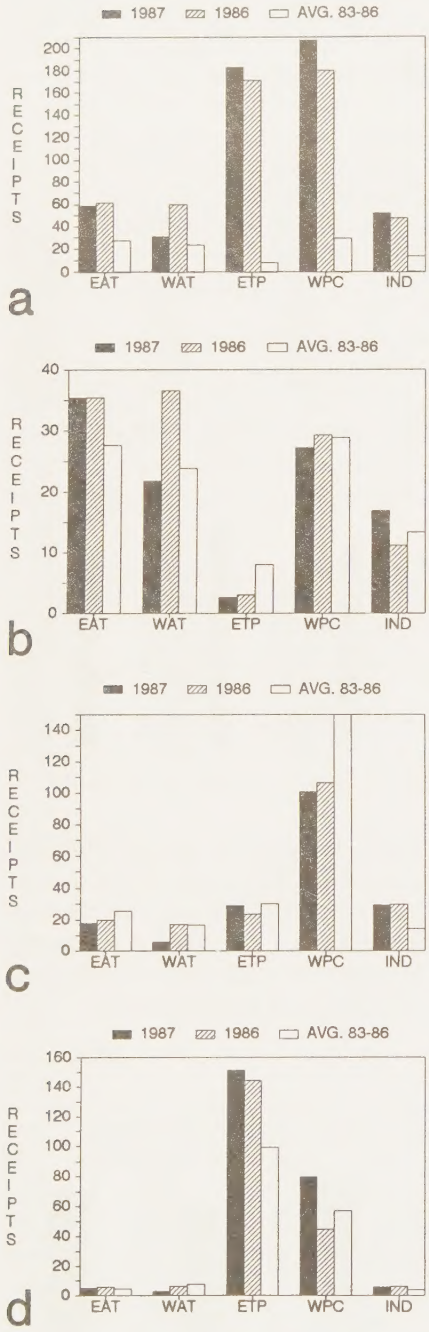



**Fig. 6.** Receipts of raw tuna by U.S. canneries (1000 st) by areas of capture in 1987, 1986 and the ave. for 1983-86. (a) total receipts (doesn't include bluefin). (b) receipts of albacore. (c) receipts of skipjack. (d) receipts of yellowfin (includes small amounts of bigeye and blackfin).

The eastern Atlantic was the major source of albacore delivered to U.S. canneries in 1987, contributing 34% of the total (Fig. 6b). The western Pacific contributed slightly less, followed by the western Atlantic, Indian Ocean, and eastern Pacific. The 1987 pattern differed from that in 1986 when the western Atlantic contributed most to U.S. cannery receipts of albacore. Over the longer term (1983-1986), the western Pacific, at 30% of the total, has been the major source of U.S. cannery receipts of albacore followed by the eastern and western Atlantic.

The western Pacific was the major source of skipjack tuna in U.S. cannery receipts in 1987, contributing 55% of the total (Fig. 6c). This pattern follows both 1986 and longer term (1983-1986) distributions of skipjack receipts by ocean area.

U.S. cannery receipts of yellowfin tuna in 1987 were dominated by fish

**Table 5.** U.S. cannery imports of raw tuna (st) by species and country for 1987.[1] Also listed are total imports for all species for 1987 and 1986.

| | SPECIES | | | TOTAL | |
|---|---|---|---|---|---|
| **COUNTRY** | **ALB** | **SJ** | **YF[2]** | **1987** | **1986** |
| S. Korea | 10,920 | 11,363 | 12,579 | 34,862 | 32,081 |
| Seychelles | 51 | 22,319 | 5,188 | 27,558 | 30,866 |
| Ivory Coast | 297 | 17,699 | 5,391 | 23,387 | 23,550 |
| S. Africa | 23,194 | 0 | 2 | 23,196 | 26,905 |
| Mexico | 0 | 1,096 | 18,309 | 19,405 | 3,219 |
| Venezuela | 6 | 4,721 | 13,955 | 18,682 | 27,478 |
| Taiwan | 13,689 | 2,201 | 1,872 | 17,762 | 14,607 |
| Vanuatu | 0 | 6,476 | 5,923 | 12,399 | 3,157 |
| Ecuador | 0 | 6,288 | 5,821 | 12,109 | 16,365 |
| Solomon Islands | 0 | 7,575 | 1,513 | 9,088 | 0 |
| Neth. Antilles | 8,246 | 14 | 241 | 8,501 | 15,165 |
| Mauritius | 8,059 | 0 | 87 | 8,146 | 6,720 |
| Panama | 0 | 250 | 6,955 | 7,205 | 24,797 |
| Trinidad | 6,219 | 45 | 774 | 7,038 | 9,946 |
| Uruguay | 6,237 | 1 | 1 | 6,239 | 9,677 |
| Singapore | 6,022 | 0 | 0 | 6,022 | 284 |
| Canary Islands | 5,802 | 0 | 8 | 5,810 | 9,204 |
| Spain | 5,808 | 0 | 0 | 5,808 | 0 |
| Other | 6,811 | 15,010 | 3,730 | 25,551 | 42,437 |
| Total | 101,361 | 95,058 | 82,349 | 278,768 | 296,459 |

[1] Country is either flag country of vessel or country exporting to the U.S.
[2] Includes a small amount of bigeye and blackfin tuna.

**Table 6.** Contract prices (U.S.$ per st) for raw skipjack and yellowfin tuna delivered by U.S. vessels to U.S. canneries in Puerto Rico for first and third and fourth quarters of 1987 and 1986.

| | SKIPJACK | | YELLOWFIN | |
|---|---|---|---|---|
| **SIZE CLASS (lbs)** | **1987** | **1986** | **1987** | **1986** |
| First quarter | | | | |
| 20 + | - | - | 765-780 | 780-800 |
| 7.5 to 20 | 685-700 | 700 | 685-700 | 700 |
| 4 to 7.5 | 615-630 | 630 | 615-630 | 630 |
| 3 to 4 | 485-500 | 500 | 485-500 | 500 |
| 3 - | 285-300 | 300 | 285-300 | 300 |
| Third and fourth quarter | | | | |
| 20 + | - | - | 1125 | 765 |
| 7.5 to 20 | 1000 | 685 | 1000 | 685 |
| 4 to 7.5 | 937 | 615 | 937 | 615 |
| 3 to 4 | 725 | 485 | 725 | 485 |
| 3 - | 450 | 285 | 450 | 285 |

from the eastern Pacific which contributed 62% of total receipts (Fig. 6d). The 1987 pattern repeats those of 1986 and the longer term.

**Major non-U.S. suppliers** during 1987 were South Korea, the Seychelles and Ivory Coast (Table 5).

**Contract prices for domestically-caught raw tuna delivered to U.S. canneries in Puerto Rico increased dramatically** from the first to the third quarter of 1987 (Tuna Newsletter Issue 88). These prices continued in the fourth quarter (Table 6). The price for 7.5 lb and larger skipjack tuna in the third and fourth quarters of 1987 was $1000 per st, up 43% from the price in the first quarter. The price for 20 lb and larger yellowfin was $1125 per st, up 44%. Typically, actual prices paid to U.S. domestic contract vessels were adjusted depending on temperature, salt content and physical condition of the fish at the time of unloading. Prices paid to non-contract domestic and foreign vessels vary according to market conditions.

**Wholesale list prices in California for canned tuna increased from the first quarter to the third quarter of 1987** (Tuna Newsletter Issue 88). These prices also continued in the fourth quarter (Table 7). Fourth-quarter prices, as reported by cannery representatives and brokers, for advertised-label, white meat tuna canned in water ranged between $59.50 and $63.75 per case, up 7% to 14% over first-quarter prices. The price range for private-label, white meat tuna was $51.00 to $51.50 per case. Wholesale list prices for advertised-

**Table 7.** Wholesale list price in California for tuna canned in water for representative case packs (U.S. $) for first and fourth quarters of 1987 and 1986.

| CASE PACK | YEAR | | ADVERTISED LABEL | PRIVATE LABEL |
|---|---|---|---|---|
| White meat | 1987 | (1st Qtr) | 55.40 - 55.95 | 43.50 - 45.50 |
| | | (3-4th Qtr) | 59.50 - 63.57 | 51.00 - 51.50 |
| | 1986 | (1st Qtr) | 54.75 - 55.95 | 42.00 |
| | | (3-4th Qtr) | 55.40 - 55.95 | 43.50 - 45.50 |
| Light meat | 1987 | (1st Qtr) | 34.20 - 43.45 | 23.00 - 26.50 |
| | | (3-4th Qtr) | 42.45 - 45.00 | 29.00 - 31.50 |
| | 1986 | (1st Qtr) | 34.20 - 43.45 | 27.00 |
| | | (3-4th Qtr) | 34.20 - 43.45 | 23.00 - 26.50 |

[1]white meat: solid 12.5-oz (24).
[2]light meat : chunk 6.5-oz (48).

**Table 8.** U.S. cannery production and value of canned white and light meat tuna for 1987, 1986 and the average for the period 1983-1986 in thousand standard cases and thousand U.S. dollars.

| YEAR | PACK | STANDARD CASES [1] | DOLLARS |
|---|---|---|---|
| | | Thousands | |
| 1987 | White meat | 7,174 | 313,611 |
| | Light meat | 26,364 | 704,048 |
| | Total | 33,538 | 1,017,659 |
| 1986 | White meat | 8,069 | 320,795 |
| | Light meat | 24,589 | 560,723 |
| | Total | 32,658 | 881,518 |
| Avg. 83-86 | White meat | 6,822 | 260,922 |
| | Light meat | 23,776 | 597,367 |
| | Total | 30,598 | 858,289 |

1/ A standard case = 48, 6.5 oz. cans

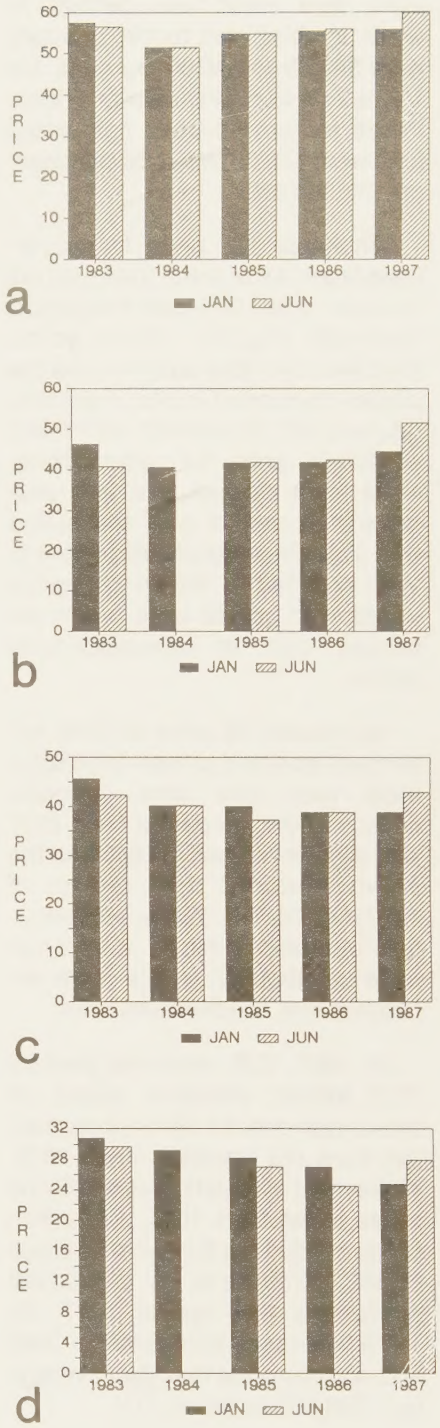



**Fig. 7.** Wholesale list prices in California for representative packs of advertised- and private-label canned tuna at the beginning and mid-points of 1983 to 1987. (a) Advertised-label, white-meat, solid, 12.5-oz (24). (b) Private-label, white- meat. (c) Advertised-label, light-meat, chunk, 6.5-oz (48).(d) Private-label, light-meat.

label, light meat tuna canned in water in third and fourth quarters were $42.45 to $45.00 per case, up 4% to 24% from first-quarter prices. Prices for private-label, light meat tuna were $29.00 to $31.50 per case, up 19% to 26%.

Wholesale list price for advertised-label, white meat tuna canned in water varied little over the period 1983-1987 (Fig.7a). Within years, there was also little variation until the above- mentioned increase in third-quarter 1987. Except for early 1983, wholesale price for private-label, white meat canned tuna was also generally constant over the period (Fig. 7b). Price varied within-year in 1983 and 1987. Within-year price variation of private label packs exceeded that of advertised-label packs.

Wholesale list price for both advertised-label and private- label light-meat tuna was also generally constant over the period 1983-1987 with slight increases in 1983 and the above-mentioned third quarter of 1987 (Fig. 7c, 7d). Within-year variation was also minimal, within-year price variation of private label exceeding that of advertised-label.

**In 1987, U.S. canners packed 33.5 million standard cases of tuna** worth over $1 billion, a production level not equalled since 1978. White meat production was 895,000 cases lower than 1986 production but exceeded the four-year average by 352,000 cases or 4%. Light meat production was up, in 1987, by 1,775,000 cases compared to 1986 and exceeded the four-year average by 2,588,000 cases or 11%.

The following persons contributed to this article: Diane Pickelsimer and Doug Prescott, SWFC.

## NEW U.S. RULES REGULATE IMPORTING YELLOWFIN TUNA TAKEN IN ASSOCIATION WITH DOLPHINS

*Ken Hollingshead*, NMFS Office of Protected Resources

**New regulations regarding importation to the U.S. of yellowfin tuna** taken in the eastern tropical Pacific Ocean (ETP) were recently issued. The "interim final rules," published in the U.S. Federal Register on March 18, 1988, implement provisions of U.S. law which amended the Marine Mammal Protection Act in 1984. The rules impose new requirements on nations which purse-seine for yellowfin tuna in the ETP and if they wish to export that tuna to the United States. Nations are now required to submit detailed information on the below-listed requirements by August 16, 1988, if they wish to export tuna after October 17, 1988. As tuna import requirements have been known for some time, there will be no waivers to the time requirements.

**United States Law (P.L. 98-364) requires that regulations governing the protection of dolphins** be established in all nations which purse-seine for yellowfin tuna in the ETP and wish to export that tuna to the United States. These laws and regulations governing the protection of porpoise in the fishery must be comparable to the regulations covering the U.S. tuna fleet. Although a nation's regulations need not be as detailed as the U.S. regulations, they must meet certain minimum standards in order to be determined to be comparable. These standards are discussed in detail in the regulations.

To be able to export yellowfin tuna to the United States after October 17, 1988, the documentation required by Chapter 50 of the U.S. Code of Federal Regulations Part 216.24(E)(5)(II) must be submitted no later than August 16, 1988.

Documentation needed for certification includes the following:

- Copies and descriptions of relevant laws, implementing regulations and guidelines, of the gear and procedures required in the tuna fishery to protect marine mammals.
- A detailed description of the method (e.g. international or national observers) by which the incidental mortality of marine mammals is monitored.
- A description of the methods used to identify problems and solutions to improve the performance of individual fishermen in reducing incidental mortality and how they will be advised.
- A list of purse-seine vessels and certified charter vessels of 400 tons or greater carrying capacity and the status of each vessel during 1986, 1987 and expected status in 1988.
- The best available data for the 1986 and 1987 calendar year on the performance of its purse-seine vessels (including certified charter vessels) fishing for tuna associated with marine mammals within the ETP including the following:

(1) Total number of tons of yellowfin tuna observed caught in each fishing area by purse-seine sets on common dolphin and on all other marine mammal species.

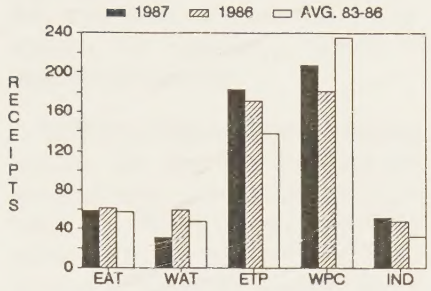
(2) The total number of marine mammals observed killed in each fishing area by purse-seine sets on common dolphin and on all other marine mammal species.

(3) The number of observed trips and number of observed purse-seine sets on marine mammals by the nation's purse-seine fleet by year during 1986 and 1987.

(4) The total number of purse-seine sets on marine mammals by the nation's purse-seine fleet during 1986 and 1987.

(5) The number of observed purse-seine sets in which more than 15 marine mammals were killed.

Errata: Page 4, Figure 6a should be as below:



Digitized by the Internet Archive
in 2025

https://archive.org/details/tuna-newsletter_1988-05_89

**The source of the above required information** must also be supplied. If the source is other than the Inter-American Tropical Tuna Commission, a description (in sufficient detail to certify authenticity and accuracy) of the method used to obtain data on marine mammal species/stocks must be supplied.

**The new U.S. law also requires each nation's tuna fleet to achieve a mortality rate comparable to the mortality rate of the U.S. purse-seine fleet.** Based on data submitted between 1986 and 1989, a nation's kill rate must demonstrate a negative trend in relation to the U.S. rate in order to be determined "comparable." After 1990, large tuna fleet nations must have an average mortality rate not more than 25 percent above the U.S. average. Nations with small tuna fleets must have an average mortality rate not more than 75 percent above the U.S. average. The different requirements are due to greater variation in kill rates due to the smaller sample size of observed sets.

**The National Marine Fisheries Service will assist any nation wishing to set up programs** similar to the U.S. program. Interested parties should contact Mr. E. Charles Fullerton, Regional Director, Southwest Region, National Marine Fisheries Service, 300 South Ferry Street, Terminal Island, California, 90731, U.S.A., telephone (213) 514-6196.

The following persons also contributed to this article: J. Herklerath, and J.G. Smith, SWR.

## COMPUTER TRACKS DOLPHIN AND TUNA VESSEL MOVEMENTS

*Elizabeth Vetter,* SWFC

**A computer model to simulate the process of "dolphin fishing" by tuna purse-seiners** in the eastern tropical Pacific Ocean (ETP) is being developed at Southwest Fisheries Center. The model, TOPS (Tuna-vessel Observer Program Simulator), will be used to test and evaluate methods for using dolphin sightings data, collected by scientific observers aboard the purse-seiners, for estimating trends in dolphin abundance.

**NMFS is responsible for setting quotas for dolphin mortality** associated with tuna purse seining in the ETP. These quotas are determined primarily on the basis of estimated trends in dolphin abundance as determined from sightings data.

Two sources of sightings data are available for making these estimates: data collected by observers on tuna vessels, and data collected during research vessel surveys. NMFS has traditionally relied more heavily on research vessel data, but tuna vessel observer data (TVOD) are much more abundant and less expensive to collect. Recently NMFS has begun a research program to develop and evaluate various methods for using TVOD in estimating dolphin abundance. The model is one aspect of that program.

**TOPS is unique among fishery models in tracking the position of each dolphin school and vessel exactly in space and time,** rather than moving the objects between boxes in a grid as is usually done with models of this type. This exact positioning was necessary because, to simulate properly the collection of dolphin sightings data from tuna vessels, the model must be able to resolve distances of less than 5-10 nautical miles (nm) between vessels and schools. It is both more versatile and more efficient computationally to track movements of individual objects than to create thousands of small grids.

Based on reported fleet sizes and estimates of dolphin school density in the ETP, TOPS includes 2,500 dolphin schools and 75 tuna vessels. Movements of dolphin schools are controlled by an underlying "environmental topography" that causes the schools to aggregate more or less tightly, depending on the parameters chosen for the topography. Movements of tuna vessels are controlled by the sighting history of each vessel; vessels tend to remain in areas where schools have been sighted and to leave areas where schools have not been seen. Movement rules for both schools and vessels include a random element, so that movements are never pre-determined exactly. This incorporates implicitly "unexplained" variability in both environmental conditions and movement decisions by schools and vessels. The environmental topography chosen for the first set of simulations is a regular grid of alternating peaks and valleys (Figure 1), generated as a function of interacting sine waves. Topographies more specific to the ETP will be used in later simulations.

Starting with a completely random spatial distribution of vessels and schools, the movement rules and environmental topography cause the dolphins to aggregate near the peaks which represent desirable areas of the environment, and the vessels to search most heavily in these areas of school concentration (Figure 2a-d). Though relatively simple, the movement rules in TOPS generate aggrega-

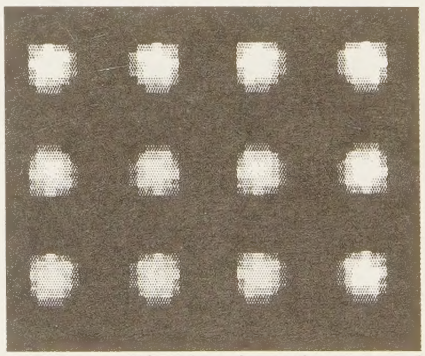


**Fig. 1.** Simulated environmental topography in TOPS model. Lighter areas represent peaks of "favorable environment" separated by areas of "unfavorable environment".

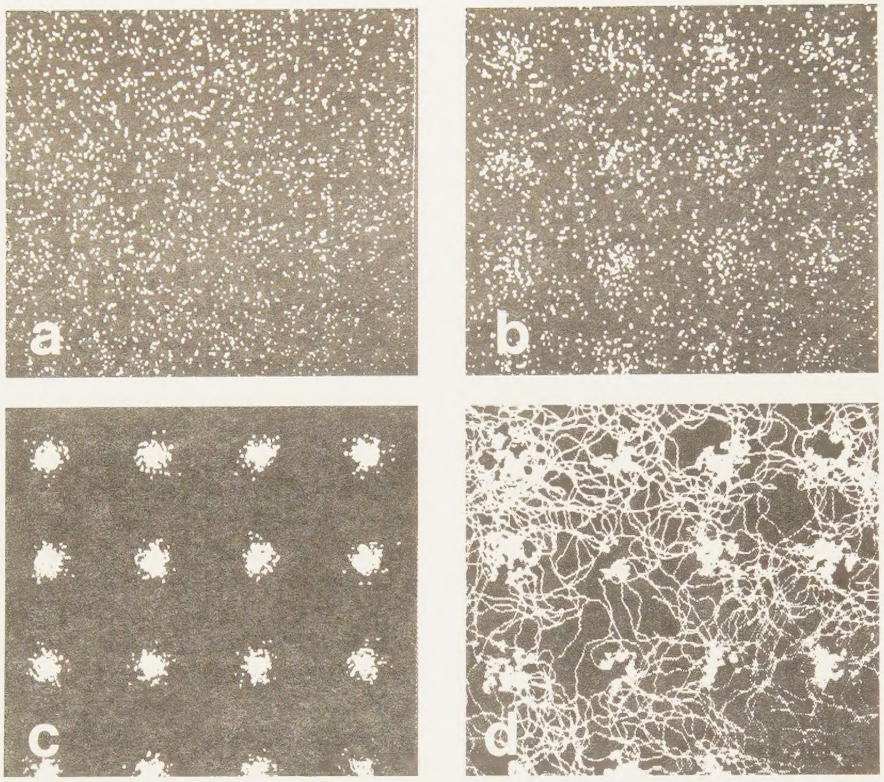



Fig 2. Time course of response of dolphin schools to underlying environmental topography, from completely random at first (a), to loosely aggregated (b) to tightly aggregated (c). Figure 2d shows tracks of tuna vessels responding to the configuration of dolphins shown in 2c. Note the concentration of effort contiguous with concentrations of dolphins.

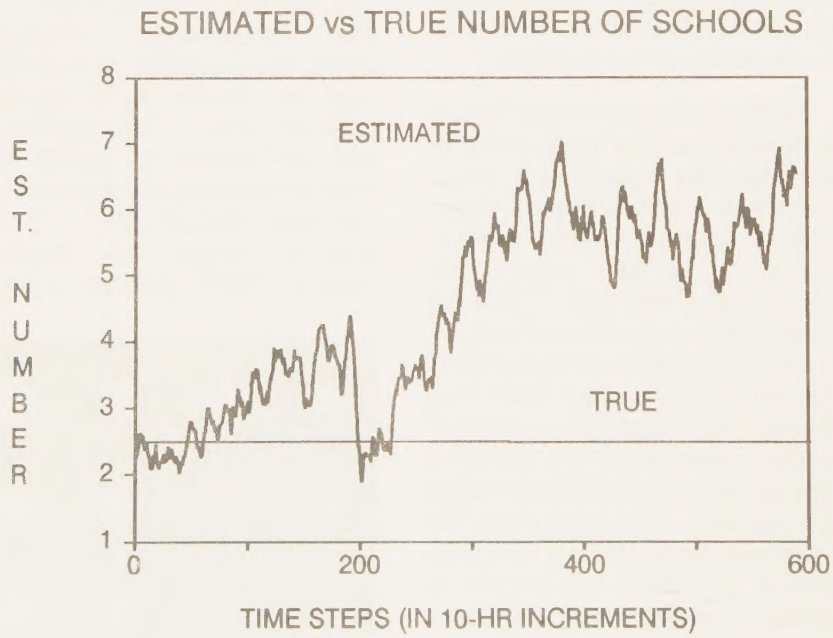



Fig. 3. Time course of school density estimates derived from simulated observer data collected during the generation of Figures 2a-2d. True density is 2500 schools (per 1200x1200 nm). Note the increase in bias as the schools become more concentrated. The dip in the curve occured when the spatial distribution of the vessels was re-randomized at that time-point. This illustrates the fact that accurate estimates can be obtained if either schools or boats are random, but accurate estimates are impossible to obtain if both groups are at all non-randomly distributed.

tions of schools and vessels on scales and in patterns that closely simulate peaks and patterns observed in TVOD.

**The first simulations tested the effects on estimates of school density** (schools/1200 $nm^2$) caused by progressively non- random spacing of dolphin schools and non-random searching by tuna vessels. Bias in the estimate increased dramatically (by a factor of 5) with increasing non-randomness in aggregation and searching (Fig. 3).

Subsequent simulations will test the effects of non- randomness at various spatial scales and other attributes of the model. A discussion of the model and these preliminary results will be presented in a series of three papers by Kleiber and Vetter at the 39th Annual Tuna Conference.

**TOPS has further applications** both for analysis of TVOD and for analyses of factors affecting the tuna fishery itself. For example, TOPS will be used to develop and test new methods for estimating from TVOD trends in dolphin abundance. Testing the methods first with TOPS provides a cost-effective way to evaluate new analytic methods without having to conduct expensive and difficult field experiments.

In addition, the model will be used to evaluate the effects on sighting rates (and by implication, fishing success) of varying characteristics of the fleet itself. These will include, for instance, the effects of code groups versus fishing independently, stationary versus migratory aggregations of dolphins and tuna, effects of different fishing strategies such as risk-taking versus conservative, log versus school versus dolphin fishing, and effects of different economic climates on optimal fishing strategies.

Pierre Kleiber, SWFC, contributed to this article.

## ECONOMIC PERFORMANCE OF THE U.S. PURSE SEINE FLEET 1979-1985

*Sam Herrick*, SWFC

**Overall economic performance of the U.S. tropical tuna fleet declined between 1982 and 1985** according to results of a recent study. Results suggest that one aspect of economic performance, productivity, improved substantially, but was offset by declines in other aspects. Falling ex-vessel prices and little change in operating and ownership costs offset productivity gains and overall economic performance declined.

**An aggregate fleet performance index (FPI) was used to indicate economic performance.** FPI combines an aggregate output price index, an aggregate input price index, and a total factor productivity index. These indices account for changes in cannery deliveries, ex-vessel prices, inputs consumed, and input prices over time.

The aggregate output price index (OPI) is computed by taking a weighted average of ex-vessel price indices for skipjack and yellowfin tuna from 1979 to 1985 constant dollar equivalents using the U.S. Gross National Product implicit price deflator. Weights used are the relative contributions of skipjack and yellowfin revenues to total ex-vessel revenue.

The aggregate input price index (IPI) is a weighted average of constant dollar price indices for major categories of factors used in owning and operating a purse-seine vessel in the U.S. tropical tuna fishery from 1979 to 1985. The inputs are labor (measured as aggregate annual crew days absent), capital (the number of purse-seine vessels in the U.S. fleet in each of the years from 1979 to 1985), fuel, and other intermediate inputs (transhipment services, repairs, gear, insurance, helicopter services, travel, and other). Weights used in calculating the aggregate input price index are the expenditures on each input category relative to the total expenditures on inputs.

A growth accounting framework was used to measure changes in factor productivity, output per unit input. A total factor productivity index (TFPI), simply the ratio of an aggregate output index to an aggregate input index, was constructed. The aggregate indices for inputs and outputs are computed from revenue share-weighted cost and share-weighted quantity indices for each input used and each output produced.

Combining the indices, the composite fleet performance index is calculated as:

$$FPI_t = OPI_t * TFPI_t / IPI_t.$$

**FPI is an expression of the economic performance of the fleet** in year "t" relative to the base year (1979 serves as the base year for all indices). The index accounts for this study, the collective effect of changes in revenues, costs, and fleet productivity on fleet performance.

Calculations indicate that the U.S. fleet experienced a net accounting loss in 1979, the base year used to calculate fleet economic indices. Therefore, when interpreting subsequent values of the FPI, a value greater (less) than one in year "t" does not necessarily mean that the fleet realized a profit (loss) in that year. It means that its economic performance improved (worsened) relative to the base year.

**After a slight increase during 1979-80, overall fleet performance fell steadily through 1982** according to the indices, at which point it rebounded due to a sharp increase in fleet productivity (Figure 1). Improvement in the fleet performance index was short-lived however, as

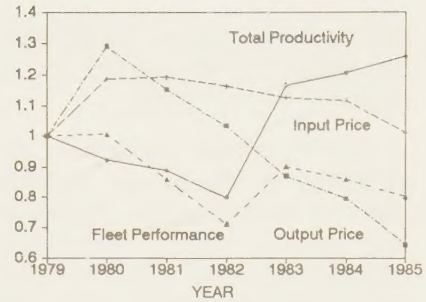



**Fig. 1.** Economic indices for U.S. tropical tuna fleet, 1979-1985

the marked decline in output (ex-vessel) prices, which began in 1980, continued to outweigh productivity gains and the slight decline in input prices experienced through the remainder of the period.

**Changes observed in the calculated performance indices for the period 1979-85 are not unexpected** given the developments in the international market for raw tuna and the expansion of the fishery into more productive grounds. As the supply of raw tuna increased, ex-vessel prices have decreased while at the same time inputs have remained relatively stable, which compelled individual vessels to improve productivity just to maintain overall performance or to leave the fishery. On a fleet-wide basis, this is probably reflected by the total factor productivity index for 1983, the year in which there was a major push by the U.S. fleet into the western Pacific, a significant increase in cannery deliveries, and a substantial decrease in the number of active vessels.

## U.S.-MEXICO TRADE AGREEMENT SIGNED

*John Dentler,* SWR

**A framework trade agreement between Mexico and the U.S.** was signed in Mexico City on November 6, 1987 by U.S. Trade Representative, Clayton Yeutter, and Industrial Developer, Hector Hernandez. Although fisheries trade issues are not

among those matters requiring future resolution, they may be taken up as part of the agreement.

**The framework agreement establishes a mandatory requirement for the two parties to consult** and discuss matters concerning bilateral trade and investment relations. Such consultations must take place within thirty days of a request for consultations by either nation.

In the event of a dispute, either party may seek to resolve the matter through the normal dispute resolution procedures of the General Agreement on Tariff and Trade (GATT), to which both members are parties. The United States and Mexico also agreed to examine the requirements and possibilities for the exchange of statistical information regarding trade.

An immediate action agenda was also set in which the U.S. and Mexico agreed to commence bilateral trade consultations within ninety days of the signing of the Agreement (by February 5, 1988). The action agenda includes trade matters involving textile products, agricultural products, steel products, investment, technology transfer and intellectual property, electronics products, and the exchange of information on the service sector.

**Mexico is a major source of fishery commodities imported by the U.S.** Over $400 million worth of fishery products were imported in 1986 from Mexico, the second most important foreign supplier of fishery products. Conversely, the U.S. exported $25 million in fishery products to Mexico in 1986. Much of this product is processed in Mexico and reimported by the U.S.

Until recently, Mexico had a 45% ad valorem tariff on fishery products. As part of its accession to the Governing Agreement on Tariff and Trade (GATT), Mexico reduced nearly all fishery import tariffs to 20%. The tariff rate on fish meal and oil was reduced to 10% and 5%, respectively. Generally, permits are required to import fishery products into Mexico and are usually granted only if there is no domestically produced substitute available.

**Industry input concerning what fishery trade and investment issues,** if any, should be taken up with Mexican trade representatives is informally solicited by the Southwest Region of the National Marine Fisheries Service. Members of the U.S. fishing and seafood industry interested in having specific fisheries-related trade and investment issues aired and resolved via this new framework agreement should contact Messrs. E.C. Fullerton or John Dentler, National Marine Fisheries Service 300 S. Ferry Street, Room 2016, Terminal Island, California, 90731.

## MEETINGS

- May 15-18, 1988. Tuna Conference. Lake Arrowhead, CA. N. Bartoo, SWFC, PO Box 271, La Jolla, CA, 92038, U.S.A.
- June 22-27, 1988. Expert consultation on stock assessment of tuna in the Indian Ocean. Indo-Pacific Tuna Development and Management Programme (IPTP). Port Louis, Mauritius. T. Sakurai, IPTP, PO Box 2004, Colombo, Sri Lanka.
- August 1-5, 1988. Billfish Symposium II, "Planning the Future of Billfish: Research and Management for the 21st Century," Hawaii. K. Hinman, NCMC, PO Box 23298, Savanah, GA, 31403, U.S.A.
- November 2-10, 1988. Annual meeting of the Standing Committee on Research and Statistics. International Commission for the Conservation of Atlantic Tunas (ICCAT). Madrid, Spain. O. Rodriquez-Martin, ICCAT, Principe de Vergara, 17, 28001 Madrid, Spain.
- November 14-16, 1988. Special meeting of the Commission. ICCAT. Madrid, Spain. O. Rodriquez-Martin, ICCAT.

## RECENT DEVELOPMENTS IN TUNA FISHERIES

*Editor's note: The following news articles were compiled from reports of the NMFS Branch of Foreign Fisheries Analysis, Office of International Fisheries, Washington, D.C. Dennis Weidner, Don Jacobson, P. Niemeier and Francisco Quintanilla contributed to these reports with the assistance of other NMFS officials and U.S. Foreign Service posts in Latin America.*

### SOUTH PACIFIC

**U.S. SENATE RATIFIES SOUTH PACIFIC TUNA TREATY** -- The U.S. Senate by a vote of 89-0 gave its advice and consent on November 6, 1987, to ratification of the Treaty on Fisheries Between the Governments of Certain Pacific Island States and the Government of the United States of America. The treaty contains provisions under which up to 50 U.S. tuna purse-seiners may fish in an area covering some 10 million square miles of Pacific Ocean. When U.S. ratification procedures are complete, only ratification of the treaty by Kiribati will be necessary to bring the treaty into force.

### WESTERN PACIFIC

**U.S. ALBACORE TROLLERS UNLOAD IN AMERICAN SAMOA** -- Fourty U.S. trollers unloaded catches of albacore in Pago Pago in January, 1988. Catch rates have been excellent and stated price is $1,600 per short ton, with unofficial prices ranging up to $2,000 per ton. The trollers are making an important contribution to American Samoa's two canneries, replacing declining

landings of albacore by non-U.S. longliners.

## LATIN AMERICA

**EL NIÑO** -- A National Oceanic and Atmospheric Administration announcement reports that the 1986-87 El Niño event has ended. Sea surface temperature anomalies in the western Pacific are still slightly more than 1°C, a very slight divergence from normal. There has been a cooling trend in surface temperatures over the past several months and winds along the equator have remained normal, allowing the cool Humboldt current (Peru current) to flow farther up the western coast of South America. While the 1986-87 event was a relatively mild El Niño, it is thought to have contributed to declining 1987 catches in Ecuador, Peru and Chile.

**EL NIÑO SCIENTISTS MEET** -- Scientists from the Comision Permanente del Pacifico Sur (which includes Chile, Colombia, Ecuador and Peru) met in Guayaquil, Ecuador, on December 5 to discuss the current 1986-87 El Niño. At the meeting, scientists from the Instituto Oceanografico de la Armada (INOCAR) reported that a very slight temperature anomaly continues off Ecuador, but according to press reports, INOCAR scientists do not expect a severe El Niño to recur soon.

**OLDEPESCA TUNA AGREEMENT** -- Representatives from ten Latin American countries met in Mexico, January 29-30, 1988 to consider a draft convention to establish a regional tuna organization under the auspices of the Organizacion Latinoamericana de Desarrollo Pesquero (OLDEPESCA). The delegates were unable to reach an agreement on the proposed convention. Efforts to establish a Latin American regional tuna management regime in competition with the U.S. backed Eastern Pacific Ocean Tuna Fishing Agreement (EPOTFA) have been a cornerstone of Mexico's tuna policy. Considerable differences, however, were expressed at the Mexico City meeting by the participating Latin American countries over sovereignty claims. Several Latin countries have claimed a 200-mile Territorial Sea rather than an Economic Exclusion Zone (EEZ). Some countries also expressed considerable concern over the character of the scientific council of the proposed organization. The participants agreed to meet again later in 1988 and try to resolve the extensive remaining differences.

## COSTA RICA

**COSTA RICAN TUNA CANNERY FOR SALE** -- The owners of Empacadora Nacional, one of the country's two tuna canneries, are interested in selling the cannery, reportedly for about U.S. $2 million. The company cans under the "Tesoro del Mar" label, the oldest fisheries trade name in Central America. The owners are reportedly concerned about their ability to compete with canners in Mexico and other Central American countries.

## ECUADOR

**COLOMBIA SEIZES ECUADOREAN TUNA VESSELS** -- Since January 1987, Colombia has seized Ecuadorean tuna vessels caught fishing in Colombian waters. Ecuadorean fishermen are reportedly avoiding Colombian waters from which approximately 35% of the Ecuadorean catch is normally taken. Some observers suggest that Ecuador's problems with Colombia may be affecting its position on the proposed OLDEPESCA Regional Tuna Agreement.

## MEXICO

**FOURTEEN TUNA SEINERS SINK** -- A severe storm hit the Baja California Peninsula on January 17 and 18 sinking or damaging 14 seiners moored in the port of Ensenada. Ten of the vessels had carrying capacities in excess of 1,200 tons. Officials of the Banco Nacional Pesquero y Portuario (BANPESCA), owner of the vessels, are trying to determine if any of the seiners can be salvaged. The sinkings will not significantly reduce the Mexican tuna catch, as all but one of the vessels had been inactive for several years. Before the storm, Mexican officials had hoped that they would finally be able to deploy the idled seiners in 1988.

**NEW TUNA ASSOCIATION FORMED** -- Thirty Mexican tuna companies formed an association named Exportadores Atuneros Unidos (EAU) in August,1987. EAU hopes to build processing and freezing plants in Mexico and other countries and coordinate the marketing of the Mexican tuna catch. EAU hopes to handle higher volumes of tuna and, thereby, to reduce marketing costs.

**TUNA PLANTS MAY CLOSE** -- Five of Ensenada's largest tuna packing plants may be forced to cease operations due to a lack of raw tuna to process. Rather than land their catches exclusively in Mexico, Mexican tuna fishermen have been exporting much of their catches to the United States where they receive a better price ($1,300 per metric ton as opposed to $800 per ton in Mexico). This practice has been criticized by Secretaria de Pesca (SEPESCA) officials and Mexican fish processing companies because the lack of raw tuna to process is causing unemployment in Mexico. Reminding the fishermen that the Mexican government financed many vessels in the tuna fleet, officials have suggested that the fishermen place "patriotic duty" above profit and land at least a part of their catch in Mexico.

**MEXICAN FISHERY CO-OPERATIVES MAY BECOME PRIVATE** -- Cooperatives have for years been a key part of Mexico's fisheries development policy. Private investors have criticized the

fishery cooperatives for inefficiency and administrative problems, but the cooperative leaders claim that they have insured that the fishermen themselves benefit from the country's fishery resources. The official candidate for President of the Partido Revolucionario Institucional, Carlos Salinas de Gortari, currently Mexico's Minister for Programming and Budget, has publicly stated his desire to "privatize" the cooperatives. The full implication of the statement is not fully understood, but could mean a major shift in Mexican fisheries policy.

**MEXICAN FISHERMEN MAY REDUCE TRANSHIPMENTS-** Panamanian companies earn millions of dollars annually from Mexican, U.S., Venezuelan, and other foreign tuna fishermen transhipping tuna catches through Panama. Panamanian companies are worried about reports that Mexican fishermen may begin to land an increasing part of their catch in Ensenada, Santa Cruz, and other Mexican ports and export it from there. During 1985, 1986, and 1987 Mexican fishermen landed only part of their catch in Mexican ports, while most of their exports were transhipped through Panama.

## PERU

**PERU ISSUES NEW TUNA FISHING REGULATIONS** -- The Peruvian government has issued new regulations governing operations of refrigerated tuna vessels in Peruvian waters. As of January 1, 1988, the Government will grant licenses only for those foreign vessels which are in the process of transferring to Peruvian registry. Peru wants foreign fishermen to end distant water fishing and initiate Peru-based operations. Most foreign tuna vessels currently licensed by Peru are Japanese longliners.


## STAFF

*Wes Parks, Editor*
*Pat Donley, Statistics*
*Hannah Bernard, Al Jackson and Diane Pickelsimer, Production Editors*
*Ken Raymond, Art Director*

## CONTRIBUTORS

*John Dentler*
*Sam Herrick*
*Ken Hollingshead*
*Elizabeth Vetter*

## ORGANIZATION

### Southwest Regional Office

*E. Charles Fullerton, Director*

### Southwest Fisheries Center

*Izadore Barrett, Science and Research Director, Southwest Region*
*Gary Sakagawa, Tuna Program Coordinator*



**U.S. DEPARTMENT OF COMMERCE**

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST FISHERIES CENTER
8604 LA JOLLA SHORES DR. - P.O. BOX 271
LA JOLLA, CALIFORNIA 92038



OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

U.S.MAIL

POSTAGE AND FEES PAID
U. S. DEPARTMENT OF COMMERCE
COM-210



DIRECTOR HONOLULU LABORATORY
NOAA/NMFS/HONOLULU
2570 DOLE STREET
HONOLULU, HI 96822-2396